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A Confirmatory Investigation of the Dimensionality of the Task and Ego Orientation in Sport Questionnaire in a Thai College Student Sample with Cross-Validation

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Abstract

This study was designed to (a) validate the Task and Ego Orientation in Sport Questionnaire (TEOSQ) with a sample of Thai college students and (b) cross-validate the TEOSQ via an application of various cross-validation procedures that are available in the structural equation modeling (SEM) literature. The sample consisted of 404 college students, ranging in age from 18 to 25 years (M=21.74) enrolled in various physical activity skills classes in Thailand. The total sample was randomly split into two samples of 202 per sample with Sample 1 serving as the calibration sample and Sample 2 as the validation sample. A Thai version of TEOSQ (Li, Harmer, Acock, Vongaturapat, & Boonverabut, 1995) was administered to the students during a regular class time.

Using confirmatory factory analysis, the TEOSQ was assessed for its construct validity and stability. Results obtained from the calibration sample supported the two factor structure as conceptualized in Goal Perspective Theory (Nicholls, 1989). Findings from the validation sample using various cross-validation methods were generally conclusive and showed that the two-factor structure model was well cross-validated. These results suggest favorable conclusions about the ability of the TEOSQ to measure athletic orientations in a cross-cultural setting.

Introduction

Following calls for greater cultural diversity in sport psychology research (Duda & Allison, 1990) some recent studies have begun to examine individual sport goal orientation in a cross-cultural context (e.g., Hayashi & Weiss, 1994; Li, Chi, Harmer, Vongaturapat, 1994; Li et al. 1995). Results from these studies have provided preliminary evidence of the validity of Goal Perspective Theory (Nicholls, 1989) as well as its measure (i.e., TEOSQ). However, further construct validity research is

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needed to fully establish the factorial validity of the TEOSQ. For example, consideration of the stability of the factor structure of the TEOSQ has yet to be given in the construct validation process.

Therefore, the present study addressed both a substantive and a methodological issue: TEOSQ construct validation and cross-validation. Specifically, it reports (a) substantive findings from a cross-validated study that tested for the factorial validity of the TEOSQ factor structure with a sample of Thai college students, and (b) an application of various cross-validation procedures that are currently available in the SEM literature.

Method

Subjects

The sample consisted of 404 male college students (M=21.74; SD=1.43) enrolled in various physical activity classes. For cross-validation, the sample was randomly divided into a calibration sample (n=202) and a validation sample (n=202).

Measure and Procedure

A Thai version of TEOSQ (Li et al. 1995) was used in this study. The questionnaire was administered to the subjects by trained research assistants during scheduled class sessions.

Data Analyses

Confirmatory factor analysis (CFA) via LISREL 8 was employed to test the factorial validity of the TEOSQ. PRELIS was employed to produce a polychoric correlation and its corresponding asymptotic variance-covariance matrix and these two matrices were used in the estimation of the CFA models via weighted least squares (WLS) estimation. The model evaluation was based on absolute, relative, and parsimony indices (cf. Bollen & Long, 1993).

The TEOSQ measurement model was subsequently cross-validated via the following cross-validation strategies: (a) complete fixed parameter, (b) invariance test, (c) fixed-structure, and (d) fixed- factor loading, and (e) fixed factor pattern. Each strategy is described in Table I.

Results

Model Fitting for the Calibration Sample

The model for the calibration sample produced a statistically significant chi-square value (x^2=113.90; df=64; $p < .001$). However, all other fit indices were generally consistent with the values recommended for an acceptable model (TLI = .915, CFI =.920, IFI = .931, RMSEA = .068). In addition, all factor loadings were significant (t-value ranging from 6.009 to 18.265) and in the positive direction (see Table 2).

Cross-Validating the Model

The two-factor structure model was further cross-validated on data from the validation sample. Results are summarized in Table 3. Model cross-validation from various approaches provided evidence that the TEOSQ measurement model provided a reasonably good representation of the observed data. Specifically, the fit indices obtained from models in which factor loadings and variances/covariances were held the same were acceptable and indicative of good fit. Browne and Cudeck's complete fixed-parameter approach provided the least fit to the data suggesting a full parameter fixed model was not tenable. Analyses based on the partial cross-validation strategies indicated that the lack of model fit was probably due to the error variances. Model fit based on the invariance approach, however, showed an overall fit of the validation sample to the calibration sample.

Discussion

This study demonstrated that the Thai data fit the TEOSQ measurement model. Substantively, findings from this cross-validated study have contributed valuable in- formation to our knowledge of TEOSQ performance when used in a cross-cultural setting. In light of the rigorous testing procedures used in this study, the TEOSQ has proven to be psychometrically sound in its measurement of sport orientation in this cross-cultural setting.

Methodologically, the study used several cross-validation approaches to reflect the range of rigor in cross-validation techniques. These approaches are useful for evaluating replicability and stability of solutions in terms of parameter estimates and overall goodness of fit of models.

Full and partial approaches test whether the whole set of parameter estimates or a subset of parameter estimates are *exactly* the same across sample I and sample 2. The invariance approach, which is conceptually similar to the full and partial approaches but less restrictive with regard to the values of the parameter estimates, provides a test of the appropriateness of the constraints placed on the model (e.g., equality of parameter estimates across samples).

Table 1
Description of Cross-Validation Strategies

Strategy	Para. held fixed under cross-validation	Para. re-estimated under cross-validation
Complete Fixed-Parameter	All	None
Invariance	Part to all moving from least stringent to most stringent estimation (factor pattern → factor loadings → factor var/cov. → error variances).	Model parameters in Sample I and Sample 2 are estimated in a sequential manner (i.e., from factor pattern, factor loadings, var/cov., and error variances)
Fixed- Structure	All factor loadings and factor var/cov.	factor error variances
Fixed- Factor Loadings	All factor loadings	factor var/cov. and error variances
Fixed- Error Variances	All error variances	factor loading and var/cov.
Fixed- Factor Pattern	None	All

TAble 2

Standardized Parameter Estimates the TEOSQ Measurement Model (Calibration Sample, n = 202)

Item	Factor 1	Factor 2	Error Variances	R
Task 1	0.574	0.0	.670	.330
Task 2	0.584	0.0	.671	.334
Task 3	0.664	0.0	.572	.443
Task 4	0.376	0.0	.874	.135
Task 5	0.727	0.0	.486	.526
Task 6	0.613	0.0	.637	.375
Task 7	0.464	0.0	.792	.213
Ego 1	0.0	0.809	.363	.646
Ego 2	0.0	0.647	.596	.415
Ego 3	0.0	0.745	.456	.557
Ego 4	0.0	0.703	.512	.492
Ego 5	0.0	0.404	.843	.168
Ego 6	0.0	0.734	.475	.535

Note. The zero parameters were fixed by hypothesis.

Table 3

Model Cross-validating under Different Strategies

Strategies	x^2	df	TLI	CFI	IFI	RMSEA
Complete Fixed-Parameter	203.33	91	.841	.814	.810	.078
Invariance						
a. Equality of number of factors	254.75	128	.913	.928	.930	.059
b. Equality of loadings	255.38	139	.926	.934	.935	.050
c. Equality of factor var/cov.	255.82	142	.929	.936	.936	.048
d. Equality of error variances	255.82	155	.943	.943	.943	.040
Fixed- Structure						
Fixed- Factor Loadings	114.07	78	.940	.940	.940	.048
Fixed- Error Variances	112.10	75	.935	.937	.938	.050
Fixed- Factor Pattern	179.71	77	.828	.830	.830	.082
	111.09	64	.905	.922	.924	.087

Note. TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; RMSEA = Root Mean Square Error of Approximation